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(54) A database system

(57) A database system accessible by a menu-driven window comprises a memory having pages (13) arranged in different levels of an arbitrary hierarchical structure (11), and a processor which enables a window generated by a terminal to access the structure (11). The pages (13) each have frames comprising a main and secondary frames. The processor allows the window to access the frames via three different types of logical links which interconnect the pages. The primary type links a page within a level to a parent and/or child page in an adjacent and logically preceeding or succeeding level. The secondary type links the frames of a page serially. The tertiary type links one page directly to another page anywhere in the structure. The primary and tertiary links are provided between any frame of a source page and the main frame of a destination page. The main frame of a page is linked to a successive page by a primary logical link, and a secondary frame of a page is linked to a common family of pages by a tertiary logical link.

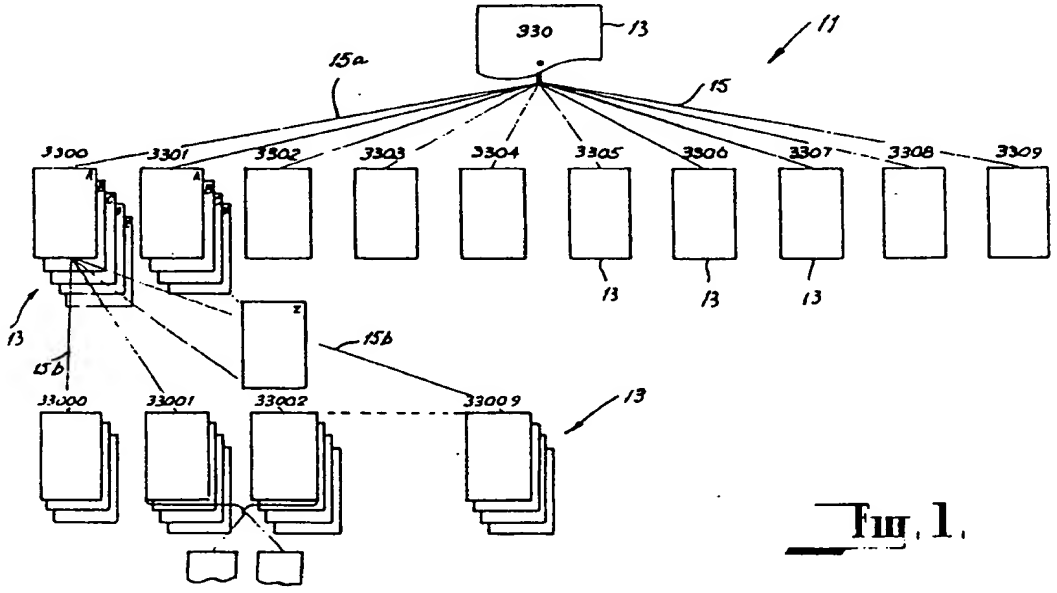

Fig. 1.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

This print embodies corrections made under Section 117(1) of the Patents Act 1977.

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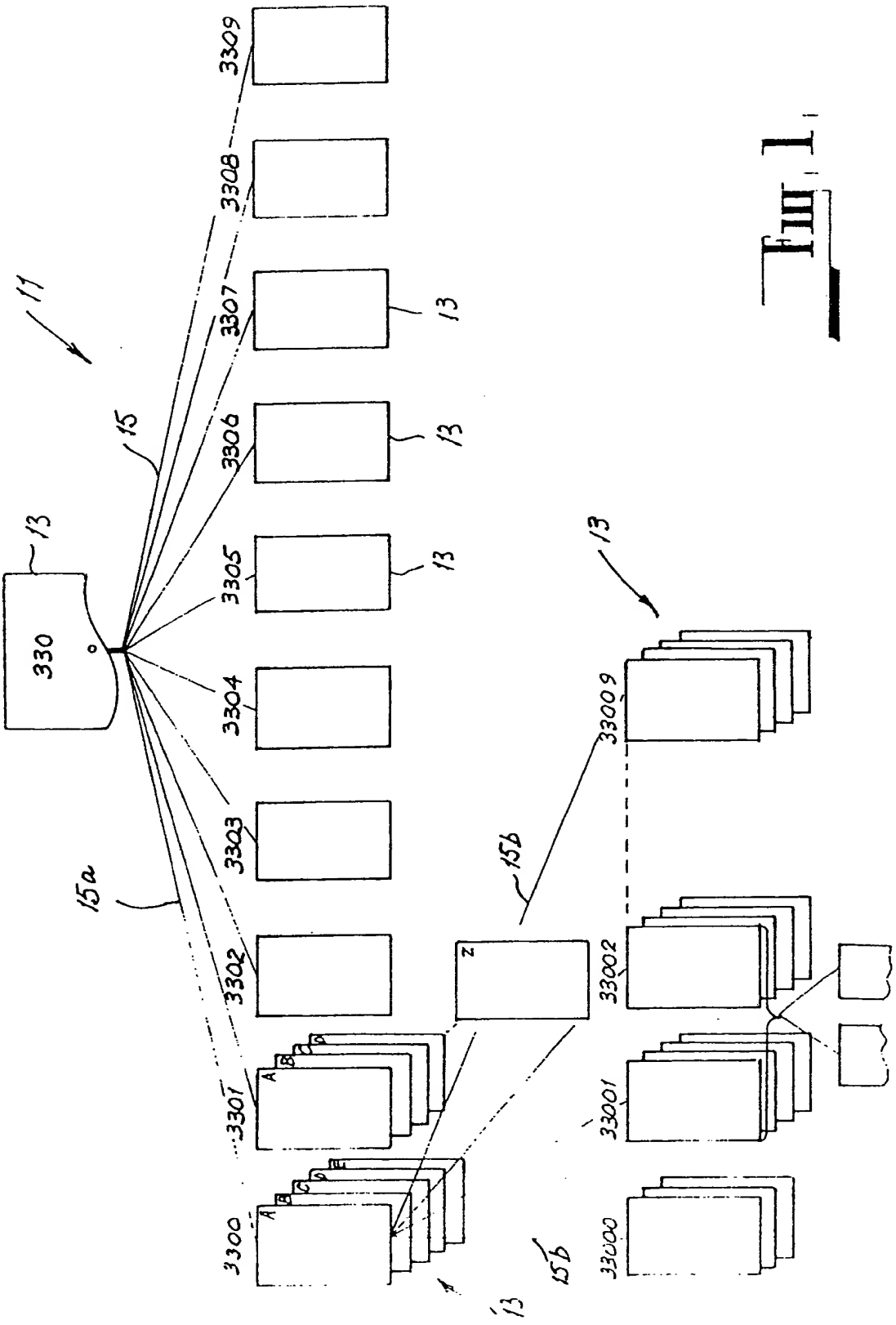

Fig. 1

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Fig 2

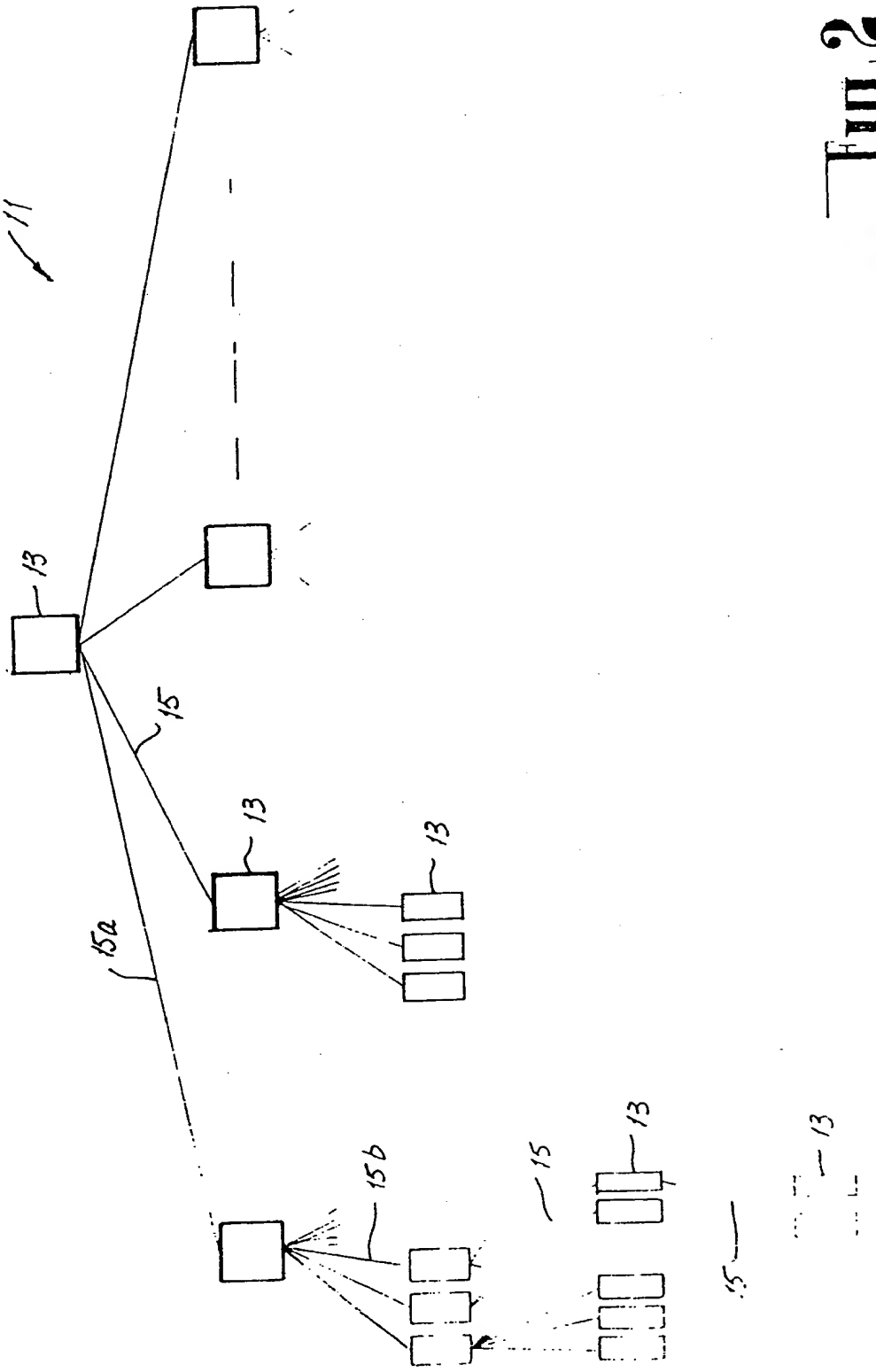
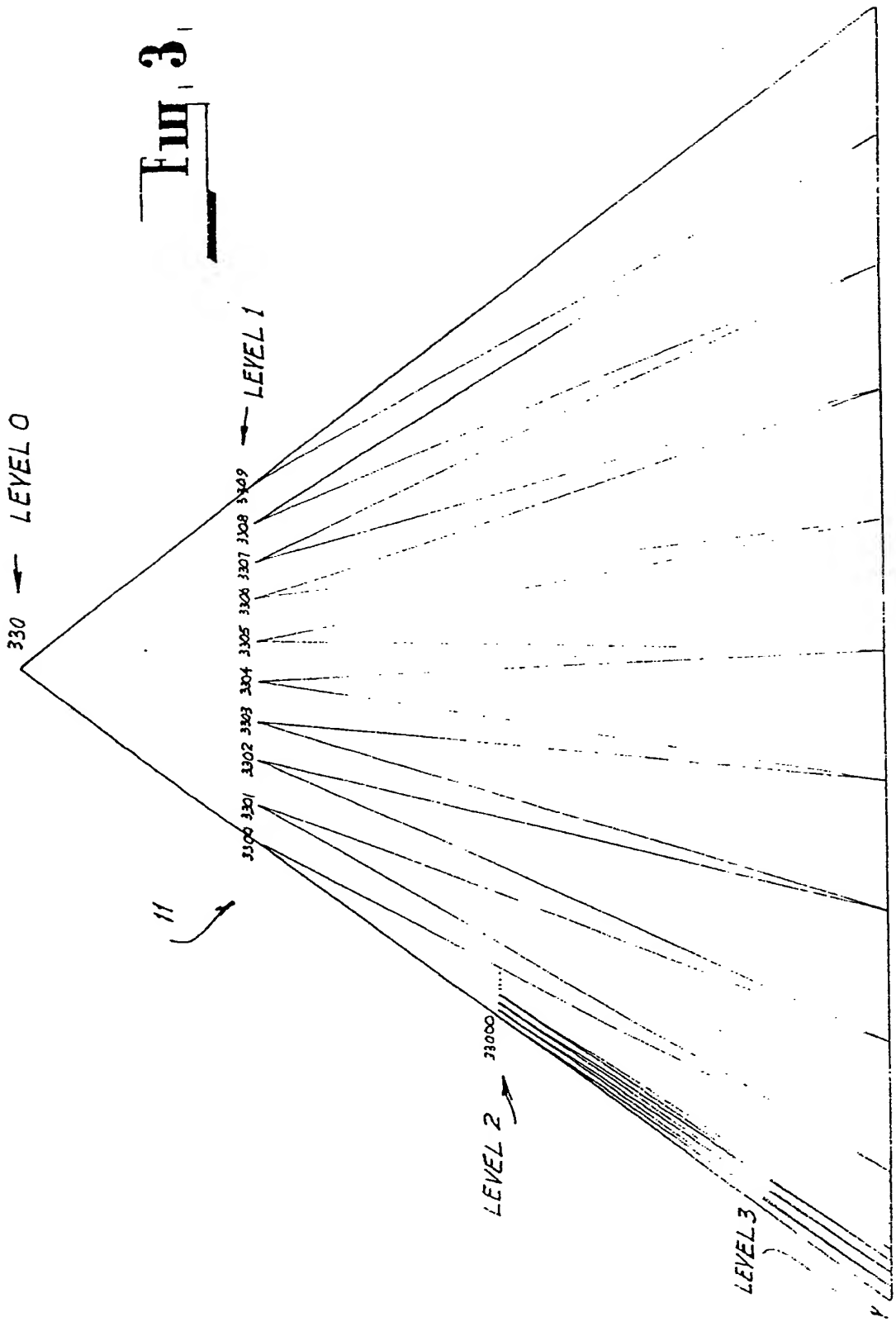


Fig. 3



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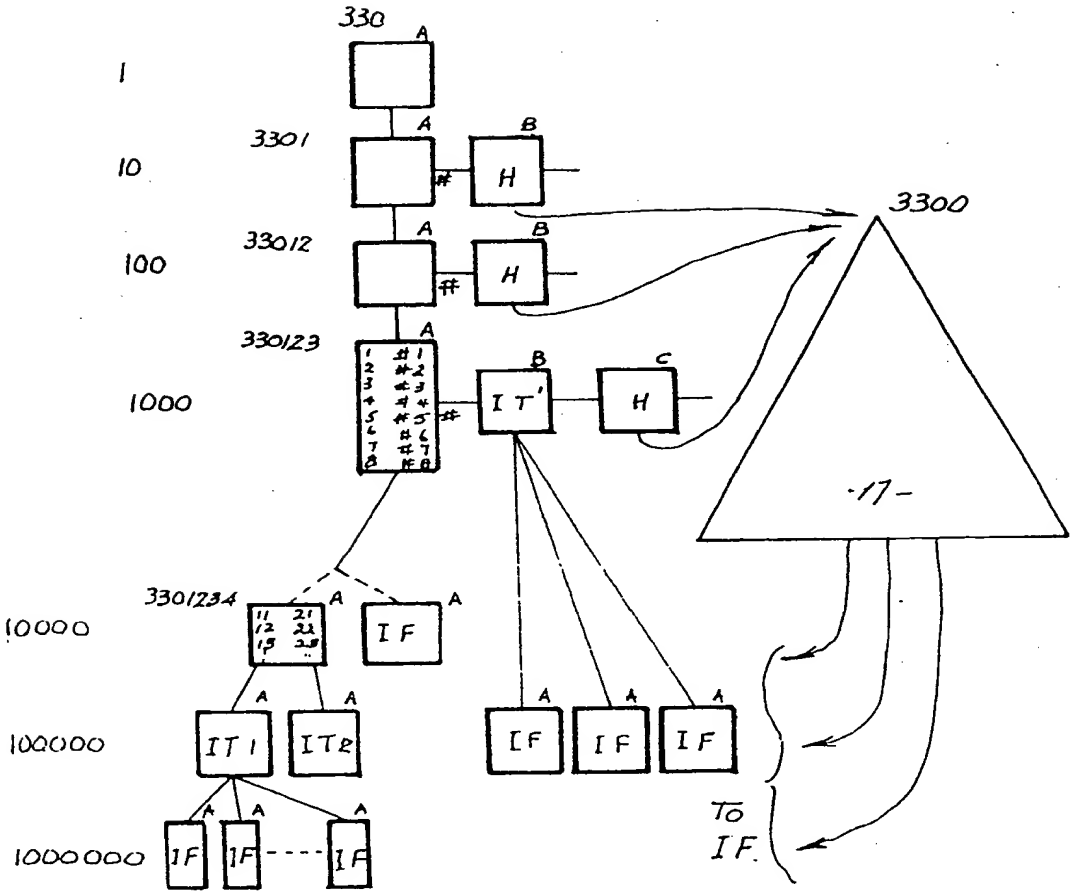

Fig 4

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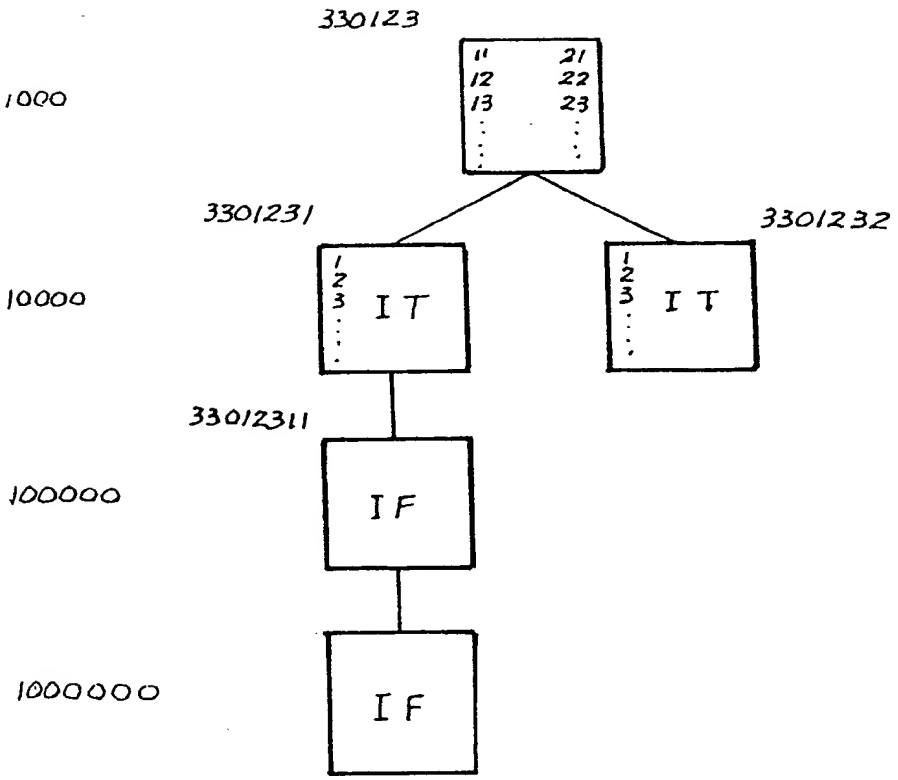

Fig 5

SPECIFICATION

A database system

THIS INVENTION relates to a database system which has particular application in the implementation of a videotex system for providing information stored on the database to a user accessing the database.

In this specification the term page is defined to mean a unitary collection of data which may be stored within a memory medium such as is associated with a computer system and which said unitary collection of data can be represented in graphical form on a display to a user of the database.

In this specification the term frame is defined to mean a sub-collection of data contained within a page, which sub-collection is of a size which can be entirely represented in graphical form on a display at any one instant to a user of the database, said page being formed by a series of adjoining frames which collectively are coterminous with said page.

In this specification the term window is defined to mean that portion of the database which can be accessed by a user and represented in graphical form on a display at any one instant, the size of the window being one frame.

In this specification, the term logical link is defined to mean the direct route which can be followed by the window from one frame to another, under the direct control of a user of the database.

The logical link between frames and pages is created on implementation of the database and usually cannot be altered by an external user of the system via the window.

As a consequence of the popularity of databases as a medium for storing information which is accessable by a number of users at any one time to recover particular aspects of the information stored thereon, much effort has gone into designing a database which is user friendly for persons accessing the same and who do not have a working knowledge of the technical aspects of the database system. Consequently, with the introduction of the videotex system into Australia and elsewhere, emphasis has been placed on utilising a database system implementation which is menu-driven and which comprises a vast quantity of pages on which information is stored, whereby the pages are arranged in a numerical sequence and can be individually accessed by page number or by use of the menu provided on the system. The videotex system which is presently implemented on the Australian telephone communications network for public use, is more commonly known by the trade mark "Viatel". This system allows for a number of service providers to implement their own database within the broad confines of the videotex system. Accordingly, a user of the Viatel system may individually access the database of a service provider for particular information given by the service provider.

Due to the vast amount of information which is capable of being stored on the Viatel database by means of the service providers, it has become increasingly difficult for a user of a particular database to enter the database of the service provider and quickly access the particular page containing the information sought. This problem has arisen mainly because of the limitations provided by the menu driven display incorporated in these databases for the purposes of maintaining user friendliness in accessing the system.

Accordingly, it is an object of the present invention to provide a database system which enables a user thereof to utilise the menu-driven window accessing system simultaneously with a direct reference accessing system, whilst maintaining user friendliness.

In accordance with one aspect of the invention, there is provided a database system accessible by a menu-driven window comprising:–

a storage means having a plurality of pages generally arranged in different levels of an arbitary hierarchical structure, some pages having a plurality of frames associated therewith, one said frame of a page being a main frame and the other frame of frames of said page being a secondary frame;

a processing means to enable access to the pages and frames of said storage means by a plurality of logical links selectively interconnecting said pages in sequence throughout said structures; said logical links being provided in three different forms, the first form comprising primary logical links which link a page within a level to a parent page in an adjacent and logically preceding level and/or to a child page in an adjacent and logically succeeding level, the second form comprising secondary logical links which link the frames of a page serially, and the third form comprising tertiary logical links which link one page directly to another page located anywhere within said structure, wherein said primary and tertiary links between successive pages are provided between a frame in the source page and the main frame in the destination page;

wherein said processing means is adapted to accommodate said window so that it may selectively access said memory means and progress through said structure by accessing an individual frame of a page at any one time, via said logical links; and

wherein said structure is arranged such that the main frame of a page is linked to a successive page by a primary logical link and a secondary frame of a page is linked to a common family of pages by a tertiary logical link.

In accordance with another aspect of the invention, there is provided a method of accessing a database system as defined at the

preceding aspect of the invention using a terminal means to interact with said processing means and which may generate one of a plurality of commands to create said window and a tertiary logical link, and access said pages of said structure via said logical links, said method comprising:

addressing a page of said structure with said window by selecting an appropriate primary or tertiary logical linking command with said terminal;

progressing said window to a secondary frame of said selected page having a tertiary logical link to said common family of pages by selecting an appropriate secondary logical linking command with said terminal;

progressing said window to a root page of said common family by selecting an appropriate tertiary logical linking command with said terminal;

progressing said window to a particular page of said family by selecting an appropriate primary logical linking command with said terminal.

The invention will be better understood in the light of the following description of one specific embodiment thereof. The description is made with reference to the accompanying drawings, wherein:–

Figure 1 is a schematic diagram of the hierarchical structure of pages comprising the database system;

Figure 2 is a more general schematic diagram of Fig. 1;

Figure 3 is a schematic diagram of a complete overview of the structure shown at Figs. 1 and 2;

Figure 4 is an alternative schematic view of the overall structure of the database; and

Figure 5 is a schematic view of an undesirable indexing structure at the lower levels of the database shown at Fig. 4.

The embodiment is directed towards a database system for implementation on the videotex system known under the trade mark "Viatel". The system is housed on a computer having a mass storage means and processing means and is capable of being accessed by a plurality of terminal means.

In the Viatel system, every database provided by a service provider thereon comprises a plurality of pages arranged in numerical order in different levels of an arbitrary hierarchical structure which is stored on the storage means. Such a structure is preferable to allow the various pages of the database to be accessed by a manu-driven window created by a terminal means and accommodated by the processing means with which a user normally accesses the database at the main index page thereof and subsequently progresses down through the database by selecting one of a number of options provided on the index to the user. The initial and subsequent access can also be effected by the user entering the page identifier code with the terminal directly, if this code is known to the user. For example, as shown at Fig. 1 of the drawings, a user may initially access the database at page 330 which is the main node of the database using the identifier code 330 and progress down through other pages of the database such as page 3300, then page 33000 and so on using the menu of the database.

In the Viatel system, each page comprises 26 frames, only one of which is individually accessed by the user at any one time. The first frame of a page is usually designated "A" and subsequent frames are designated with the remaining letters of the alphabet in succession. Thus, upon initially accessing page 330, the user will in fact access frame "A" of page 330.

By the user issuing an appropriate command, frame "B" of page 330 may be accessed, followed by frame "C" and so on. In addition, by using the menu-driven window, the first page will provide a number of options, usually 10, from which the user can choose the desired option. Thus, in total, the user has for example 10 options with which he may jump to the "A" frame of another page, and one further option with which he may jump to the next frame of the page which is presently accessed.

In the Viatel system, a user will normally be accessing the database via the telephone communication network to which the terminal means, incorporating a cathode ray tube and keyboard, is connected via a modem or other suitable interfacing means. Accordingly, upon accessing a page, the user will have displayed to him the information appearing on the particular page frame which is accessed by the window at that particular point in time. By pressing an appropriate key on the keyboard which corresponds to a particular option given on the frame of information, the user's window will progress to another page provided at another location within the database.

Thus on frame "A" of page 330, 10 options may be given each of which are located at frames "A" of pages 3300 to page 3309, respectivel. Upon the window being shifted to page 3301, for example, frame "A" of page 3301 may provide a number of other options which may progress the user's window to a page at another level of the database. For example, one of the options may transfer the user window to page 33002, and so on. Alternatively, the user may press the appropriate command to progress the user window to the succeeding "B" frame where he may encounter a similar array of options as were provided on the "A" frame.

Another feature of Viatel, is that upon accessing any frame of a page it is only possible to transfer the window via the menu to the "A" frame of another page and not any of the other frames thereof. Accordingly, it is

common in designing database systems for use on Viatel, to only use the "A" frame of any page for the initial levels of the system which are devoted solely to providing the menu by which a user window may progress down through the database. Furthermore, in such databases it may be necessary to progress down through 6 or 7 levels before the information sought within the database is actually accessed. From a users view point, accessing such a database can be extremely tedious, especially when a user becomes familiar with the system and desires to seek out information therefrom in a relatively quick period of time. Although information can be directly accessed using the appropriate page identifier code, most users would not be aware of the particular code beforehand unless they kept a directory of these pages. In view of the fact that it is rather impractical to keep a directory of all pages ever likely to be accessed this technique of direct access also has its limitations.

With regard to the present invention, as shown at Figs. 1 and 2, the pages 13 of the database 11 are selectively interconnected in a logical sequence throughout the structure by a plurality of logical links 15. As previously discussed, each page has a plurality of frames, one frame within a page being a main frame, e.g. frame "A", and the other frames within a page being secondary frames, e.g. "B" to "Z".

The logical links 15 are provided in three different forms. The first form comprises primary logical links 15a, more commonly known as strict routing, which link a page within a level to a page in an adjacent level. Moreover, for a page at an intermediate level, a primary logical link connects such a page to a parent page in the adjacent and logically preceding level. In addition, one or more logical links may link the same page to a child or children pages in an adjacent and logically succeeding level. For example, as shown in the accompanying drawings, page 3300 is connected by a primary logical link 15a to its parent page 330 and by a number of primary logical links 15b to its children pages 33000 to 33009. The main node of the database, namely page 330, may or may not have a primary logical link to a parent page, depending upon the design parameters of the overall system. For example, in Viatel, the main node of any service provider database on the system, must have a primary logical link back to page 0, which is the main node of Viatel. Conversely, the pages at the bottom level of the database have no primary logical links to children pages.

The second form of logical link consists of secondary logical links which link the frames associated with a particular page serially. Thus, frame "A" of a page is connected to frame "B" by a secondary logical link, and frame "B" is connected to frame "C" by the same and so on. In order to access these secondary frames by means of the user window, it is necessary to press the command key provided in the keyboard specifically for this function, which command is not of the type provided for following the menu of the system.

The third form of logical link consists of a tertiary logical link, more commonly known as free routing, which connects one page directly to another page, wherein the other page may be located anywhere in the system. This tertiary logical link may be sourced from any frame of a page and is always destined for the "A" frame of the page to which it is linked. These tertiary logical links can be designed into the database in a permanent manner initially and/or can be independently created of a transient nature by the user terminal using identifer codes for pages to be accessed.

In arranging the database in accordance with the present invention, the main frame of every page is linked to a successive page by at least one primary logical link, thereby enabling the user window to progress through the database in accordance with a menu provided on the main frame of each page. In addition, and importantly, one of the secondary frames and preferably the "B" frame of each page is linked to a common family of pages, the root page of which is the same for all "B" frames of the database. For convenience, a portion of the database is permanently set aside from the remainder of the database to locate the said common family of pages.

In the present embodiment use is made of a pair of successive pages in the same level to define the root pages for the common family of pages. These root pages, in effect, form intermediary pages which can direct the window by means of primary logical links to any of the multitude of children pages located in the succeeding levels of the family. By adopting dual intermediary pages, the number of pages in the common family which may be sourced to every "B" frame within a distance of two logical links, is double that which may be derived from a single intermediary frame. Moreover, when the user window is located on any "A" frame within the database, and the user wishes to access the common family of pages to hasten progress through the database, the "B" frame may be accessed by pressing the appropriate command on the keyboard, progressing the user window via a secondary logical link to the "B" frame. The corresponding "B" frame may contain a common index of options provided within the common family. Such options may be double the number usually provided on the "A" frame of a page and may be accessed by keying two digits on the keyboard rather than one. The first digit pressed will always be routed to

one or the other intermediary pages defining the root pages of the common family. Thus, on pressing the first digit, the user window is progressed to the appropriate intermediary page via a tertiary logical link. Subsequently, on pressing the second key a corresponding child to the first selected intermediary frame will become the destination page of the user window and thus the user window will progress to this child page by means of a primary logical link.

In practice, the first and second keys are usually pressed in relatively quick succession, and so the user would not usually see the intermediary page.

The destination page within the common family, or any of its children or offspring thereof, may contain reference information to assist the user to locate specifically the page within the database to which the user desires access. For example, the destination pages may contain an alphabetical index according to subject matter, and alphabetical index according to business name or the like, wherein each entry may contain the relevant page number required to directly access the said page or alternatively enable linkage to the said page by means of another tertiary logical link.

Fig. 4 provides a schematic view indicating the general structure of the database wherein all "B" frames contain help in information H and are linked by tertiary logical links to the common family of pages 17, root node of which may be page 3300, for example. This common family of pages 17 may contain an extensive, cross-referenced index whereby relevant index-entries specifying page identifier codes may be accessed by primary logical links, which in turn, may be linked by tertiary logical links, either permanent or transient, back to the relevant page containing the sought information within the main body of the database.

Thus a user may rapidly seek out the particular page within the database to which access is ultimately required by progressing along a minimum number of primary logical links and utilising tertiary logical links to the common family of pages for reference and subsequently direct access to the particular page sought.

Having regard to another aspect of the present embodiment, which utilises a common family of pages to achieve a slightly different effect, reference is made to Figs. 4 and 5 of the drawings, where seven levels are provided within the service provider database.

It is usually necessary to maximise the information storage capacity of the database by reducing the number of primary logical links between "A" frames of pages devoted to the menu-driven indexing system. This becomes particularly critical towards the lower levels of the database where the total number of pages within a level increases dramatically, and thus many pages can be lost on a level if the level has been devoted to further break-down of the menu-driven index.

For example, at level 1000, only three lower levels are available for providing information to the user. If the index at this level needs to be broken further, as shown at Fig. 5, then only one family of pages commencing at level 10000 and extending over two lower levels, would be available for information. As previously described, to increase the size of the family laterally, a dual index would normally be provided at level 1000 utilising intermediary pages IT at level 10000 to effectively provide two families of pages commencing at level 100000 and extending over one lower level for information. This is a slightly better proposition than with not utilising the dual indexing system.

However, by utilising the tecnique of accessing a secondary frame by a secondary logical link and subsequently progressing the user window down to the relevant information level IF by tertiary logical links, in a dual page indexing system, an additional level of pages may be preserved within the system for information.

This is better illustrated by reference to Fig. 4, where at level 1000 of the database, it is necessary to break the menu-driven index further. Thus, the dual page indexing system is adopted, where the "A" frame of page 330123 is provided with two columns of options, rather than a single column. Therefore 20 options rather than 10 can be provided. However, rather than utilising two intermediary pages IT1 and IT2 both of which are located at the next level by primary logical links, the second coloumn of options is linked by a secondary logical link to the "B" frame of page 330123, and so forms an intermediary frame IT' on the same level as the dual index page, i.e. level 1000.

For example, the first column of options may be numbered 0 to 9 which connect the "A" frame of page 330123 via primary logical links to the "A" frames of pages 3301230 to 3301239, respectively, which are at level 10000. The second column of options, however, contains two symbols. The first symbol being the command for progressing the user window to the adjacent frame via a secondary logical link, e.g. #, and the second symbol being a digit from 0 to 9. Thus on pressing #, the user window would jump to the "B" frame of page 330123, and on pressing the next digit, the user window would jump to the relevant destination page.

For example, the "B" frame of page 330123 would be connected by tertiary logical links to pages at level 100000. Thus two families of pages are obtained by using the dual indexing system, and importantly, the last level, vis. 1000000, is preserved for further use.

Furthermore, the first column of options provided at level 1000 can either link to information at level 10000 or can link to a further dual index at level 10000, the latter providing access to information at the last level, vis. level 1000000.

Accordingly, the method of accessing the secondary frame of a page of a secondary digital link as a means of lateral expansion of the index provides a powerful tool in maximising the efficient use of the database.

It should be appreciated that the provision of tertiary logical links is a significant advantage over databases only having provision for primary and secondary logical links in which progress through the database can only be made by utilising the menu or having prior knowledge of the precise page number which is sought.

Furthermore, by adopting a consistent approach to the layout of the database whereby all "A" frames are linked to successive pages by primary logical links and all "B" frames are linked to the intermediary pages of the common family of pages by tertiary logical links, not only is the efficiency in accessing the database greatly improved, but also the design of database for use in the videotex system is greatly facilitated.

It should be appreciated that the scope of the present invention is not limited to the scope of the particular embodiment herein described. In particular the invention is not limited to the implementation of a database on the Viatel or videotex systems but may find utility in other forms of database contained within different environments such as Prestel (RTM).

CLAIMS

1. A database system accessible by a menu-driven window, comprising:—

a storage means having a plurality of pages generally arranged in different levels of an arbitary hierarchical structure, some pages having a plurality of frames associated therewith, one said frame of a page being a main frame and the other frame or frames of said page being a secondary frame;

a processing means to enable access to the pages and frames of said storate means by a plurality of logical links selectively interconnecting said pages in sequence throughout said structures; said logical links being provided in three different forms, the first form comprising primary logical links which link a page within a level to a parent page in an adjacent and logically preceding level and/or to a child page in an adjacent and logically succeeding level, the second form comprising secondary logical links which link the frames of a page serially, and the third form comprising tertiary logical links which link one page directly to another page located anywhere within said structure, wherein said primary and tertiary links between successive pages are provided between a frame in the source page and the main frame in the destination page;

wherein said processing means is adapted to accommodate said window so that it may selectively access said memory means and progress through said structure by accessing an individual frame of a page at any one time, via said logical links; and

wherein said structure is arranged such that the main frame of a page is linked to a successive page by a primary logical link and a secondary frame of a page is linked to a common family of pages by a tertiary logical link.

2. A database system as claimed at claim 1, wherein a tertiary link from any of the pages of said common family of pages may be created by said processing means to any of the pages of said structure upon a page of said common family be accessed by said window.

3. A database system as claimed at claim 1 or 2, wherein said secondary frame of a page which is linked to said common family of pages is the next accessible frame after the main frame.

4. A database system as claimed at any of the preceding claims as dependent upon claim 2, wherein said common family of pages comprises a discrete hierarchical sub-structure of pages within said structure, and being connected thereto only by means of a primary logical link between the root page of said sub-structure and its parent, and tertiary logical links as claimed at claim 2.

5. A database system as claimed at any of claims 1 to 3, wherein said common family of pages is arbitrarily disposed within said structure.

6. A database system substantially as described herein with reference to the accompanying drawings mutatis mutandis.

7. A method of accessing a database system as claimed at any of the preceding claims using a terminal means to interact with said processing means and which may generate one of a plurality of commands to create said window and a tertiary logical link, and access said pages of said structure via said logical links, said method comprising:

addressing a page of said structure with said window by selecting an appropriate primary or tertiary logical linking command with said terminal;

progressing said window to a secondary frame of said selected page having a tertiary logical link to said common family of pages by selecting an appropriate secondary logical linking command with said terminal;

progressing said window to a root page of said common family by selecting an appropriate tertiary logical linking command with said terminal;

progressing said window to a particular page of said family by selecting an appropriate

primary logical linking command with said terminal.

8. A method as claimed at claim 7, wherein said method includes addressing a desired page of said structure directly by creating an appropriate tertiary logical link from a previously selected page of the family to the desired page using the page identifer code and tertiary logical linking command with said terminal; wherein said page identifier code is provided on the selected page of said family.

9. A method of accessing a database system substantially as herein described with reference to the accompanying drawings mutatis mutandis.

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